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APPLICATION FOR LETTERS PATENT

for

**SYNTHESIS OF ENERGETIC THERMOPLASTIC ELASTOMERS
CONTAINING OLIGOMERIC URETHANE LINKAGES**

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SYNTHESIS OF ENERGETIC THERMOPLASTIC ELASTOMERS CONTAINING OLIGOMERIC URETHANE LINKAGES

[0001] Priority is claimed on United States Provisional Application 60/108,456 filed on November 12, 1998, the complete disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] This invention relates to energetic thermoplastic elastomers which are useful as binders of high-energy compositions, such as propellants, especially rocket propellants and gun propellants, explosive munitions, gas generants of vehicle supplemental restraint systems, or the like, and to methods for synthesizing the same.

2. Description of the Related Art

[0003] Solid high-energy compositions, such as propellants, explosives, gasifiers, and the like comprise solid particulates, such as fuel particulates and/or oxidizer particulates, dispersed and immobilized throughout a polymeric binder matrix.

[0004] Conventional solid composite propellant binders utilize cross-linked elastomers in which prepolymers are cross-linked by chemical curing agents. As outlined in detail in U.S. Patent No. 4,361,526, there are important disadvantages to using cross-linked elastomers as binders. Cross-linked elastomers must be cast within a short period of time after addition of the curative, which time period is known as the "pot life." Disposal of a cast, cross-linked propellant composition is difficult, and usually is accomplished by burning, which poses environmental problems. Furthermore, current state-of-the-art propellant compositions have serious problems that include their use of nonenergetic binders which have lower performance and high end-of-mix viscosities.

[0005] In view of the inherent disadvantages associated with the use of cross-linked elastomeric polymers as binder materials, there has been considerable interest in developing thermoplastic elastomers suitable as binders for solid, high energy compositions. However,